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References

1. YU, P. L., *Qualification of Optimal Strategies and Singular Surfaces of a Class of Differential Games*, Journal of Optimization Theory and Applications, Vol. 6, No. 6, 1970.
2. ISAACS, R., *Submarine Surveillance Problem* (unpublished paper).
3. DOBBIE, J. M., *Maintaining Tracking Contact on a Submarine*, Arthur D. Little, Inc., Working Memorandum No. 225-226, 1965.
4. ISAACS, R., *On Bang-Bang-Bang Surfaces in Differential Games*, Department of the Navy, Memorandum No. (OEG) 499-66, 1966.
5. YU, P. L., *Transition Surfaces of a Class of Differential Games*, Johns Hopkins University, Ph.D. Thesis, 1969.

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